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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,791	06/19/2001	David S. Kurtz	4173-101	4360

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INTELLECTUAL PROPERTY / TECHNOLOGY LAW  
PO BOX 14329  
RESEARCH TRIANGLE PARK, NC 27709

EXAMINER

MILLER, RYAN J

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/884,791

Applicant(s)

KURTZ ET AL.

Examiner

Ryan J. Miller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-28, 31 and 36-43 is/are rejected.
- 7) ☒ Claim(s) 1-23, 29, 30, and 32-35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed July 13, 2001 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. The IDS is missing European Patent No. 0 196 662 listed on the form PTO-1449. The examiner requests that the applicant file a copy of this reference for consideration. The examiner considered the remaining references in the IDS.
2. The examiner requests a copy of the article by Horst Ebel entitled "Crystallite Size Distributions from Intensities of Diffraction Spots" as cited on page 4, line 26 – page 5, line 1 of the specification. This reference is pertinent to the examination of this application. Full consideration of this prior art is essential.

### ***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "14" in Figs. 1A and 1B. Figures 2, 9, and 10 should also be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawing sheets, or amendment to the specification to add the reference character(s) in the description, are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion

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of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

*Specification*

4. The disclosure is objected to because of the following informalities: The examiner requests that the applicant update the status of application no. 09/365,063 mentioned on page 18, line 12 and page 19, line 14 of the specification.

Appropriate correction is required.

*Claim Objections*

5. Claims 1-43 are objected to because the numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not). In the instant application, two separate and distinct claims have been numbered 30 and two separate and distinct claims have been numbered 35.

Appropriate correction is required.

6. The following quotation of 37 CFR § 1.75(a) is the basis of objection:

(a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

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7. Claims 5 and 28 are objected to under 37 CFR § 1.75(a) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery.

Claims 5 and 28 each call for the limitation "in a range of from about" at line 2. This limitation is grammatically awkward. The examiner suggests amending this limitation to read, "in a range of about".

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 31 and 36-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 31 is dependent from claim 30 and claims 36-38 depend from claim 35. However, two claims have been presented as claim 30 and two claims have been presented as claim 35. Furthermore, it cannot be determined from the present claim language whether claim 31 should depend from the first claim 30 or the second claim 30 and it cannot be determined whether claims 36-38 should depend from the first claim 35 or from the second claim 35. Therefore, these claims are rendered indefinite since their proper dependency cannot be established.

***Double Patenting***

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686

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F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 24-28 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 10, and 27 of Kurtz et al. (U.S. Patent No. 6,301,330 B1 in view of Maris (U.S. Patent No. 6,038,026).

As applied to claim 24, Kurtz et al. claims a crystal grain size analyzing system for determination of average crystal grain size and size distribution of a polycrystalline material, said system comprising: a sample comprising said polycrystalline material and defining an associated sample plane (see claim 1, first limitation); a collimated source of monochromatic radiation energy arranged to direct radiation energy to a measurement point on the sample, wherein said collimated source comprises means for adjusting beam size and divergence of the monochromatic radiation energy (see claim 1, second limitation); a 2-dimensional area detector that registers radiation energy diffracted from the sample at the measurement point, said collimated source of monochromatic radiation energy and said 2dimensional area detector being in a fixed spatial relationship to one another and sufficiently proximate to the sample measuring point to capture a plurality of diffraction arcs within a single data capture frame of said detector (see claim 1, third limitation); and a sample motion assembly translating the sample in the sample plane (see claim 1, fourth limitation).

As applied to claim 25, Kurtz et al. claims that the monochromatic radiation energy source emits monochromatic x-radiation (see claim 2).

As applied to claim 26, Kurtz et al. claims that the sample motion assembly is constructed and arranged to permit only in-plane motions of the sample (see claim 10).

As applied to claim 27, Kurtz et al. claims that the system does not include any Eulerian cradle providing  $\chi$  rotation, or any  $\theta$ - $2\theta$  goniometer component or apparatus (see claim 27).

Claim 27 further calls for an integral grain size analysis processor constructed and arranged to generate average grain size and grain size distribution data from the detected diffraction data of the diffracted energy.

While Kurtz et al. claims the use of a texture processor, the reference does not claim an integral grain size analysis processor constructed and arranged to generate average grain size and grain size distribution data from the detected diffraction data of the diffracted energy.

Maris, in the same field of endeavor of diffraction and the same problem solving area of crystallography, discloses an integral grain size processor constructed and arranged to generate average grain size and grain size distribution data from the detected diffraction data of the diffracted energy (see column 2, lines 9-11: The reference describes that the system has a means (i.e. integral grain size analysis processor) for the determination of both grain size and distribution.).

As applied to claim 28, Maris discloses that the sample comprises a textured polycrystalline material having grain size within a range of about 0.1 micron to about 100 microns (see column 5, line 66: The reference provides an example of a film (i.e. polycrystalline

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material) with a thickness (i.e. size) of 1 micron (i.e. within a range of about 0.1 micron to about 100 microns).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Kurtz et al. by adding a an integral grain size analysis processor constructed and arranged to generate average grain size and grain size distribution data from the detected diffraction data of the diffracted energy as taught in Maris because such a processor provides the system with “a method for grain size determination [that is] non-destructive, [that is] able to measure the grain size within a small area of film, and [that] give[s] results in a short period of time” (see Maris: column 1, lines 60-62). These elements are important in the semiconductor device fabrication industry.

12. Claims 39 and 40 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Kurtz et al. (U.S. Patent No. 6,301,330 B1) in view of Maris (U.S. Patent No. 6,038,026 A), as applied to claim 24 in the rejection above, and further in view of Kurtz et al. (U.S. Patent No. 5,724,401 A).

Claim 39 further calls for the collimated source to comprise a sealed x-ray beam source, a monochromator, and a tapered capillary collimator.

These elements are not claimed in Kurtz et al. (U.S. Patent No. 6,301,330 B1) and are not fully described in Maris. However, in the same field of endeavor of X-ray diffraction and the same problem solving area of crystallography, Kurtz et al. (U.S. Patent No. 5,724,401 A) discloses that the collimated source comprises a sealed x-ray beam source, a monochromator, and a tapered capillary collimator (see Fig. 1: Reference numeral 10, referring to an X-ray



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source, Reference numeral 11 referring to a collimator, and reference numeral 13, referring to a monochromator).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Kurtz et al. (U.S. Patent No. 6,301,330 B1) and Maris by adding the collimated source arrangement disclosed Kurtz et al. (U.S. Patent No. 5,724,401 A) because the use of such an arrangement provides a steady monochromatic x-ray source since the “monochromator 13 placed in front of the source is highly advantageous to reduce background radiation” (see Kurtz et al. (U.S. Patent No. 5,724,401 A): column 11, lines 2-4).

Claim 40 calls for the two-dimensional area detector to be position sensitive.

This element is not claimed in Kurtz et al. (U.S. Patent No. 6,301,330 B1) and is not fully described in Maris. However, in the same field of endeavor of X-ray diffraction and the same problem solving area of crystallography, Kurtz et al. (U.S. Patent No. 5,724,401 A) discloses that the detector is position sensitive (see column 10, line 67 – column 11, line 5: The reference describes the use of a position sensitive detector.).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Kurtz et al. (U.S. Patent No. 6,301,330 B1) and Maris by adding a position sensitive detector as taught in Kurtz et al. (U.S. Patent No. 5,724,401 A) because the use of such a detector allows for a “large angle, flexible geometry, high resolution, ... position sensitive x-ray detector for x-ray diffraction applications” (see Kurtz et al. (U.S. Patent No. 5,724,401 A): column 6, lines 20-23).

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13. Claims 41-43 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Kurtz et al. (U.S. Patent No. 6,301,330 B1) in view of Maris (U.S. Patent No. 6,038,026 A), as applied to claim 24 in the rejection above, and further in view of "Hi-Star Area Detector" (<http://www.esc.cam.ac.uk/new/v10/research/facilities/xray/histar.html>).

Claim 41 calls for the two-dimensional area detector to comprise means for transfer of detected diffraction data into electronic digital format and claim 43, which is representative of claim 42, calls for the two-dimensional area detector to comprise a multiwire gas proportional counter.

These elements of the two-dimensional area detector are not claimed in Kurtz et al. or disclosed in Maris.

However, the "Hi-Star Area Detector" discloses such features. (Note: This is the same multiwire gas proportional counter described in the applicant's specification on page 17, lines 17-19.).

As applied to claim 41, "Hi-Star Area Detector" discloses means for transfer of detected diffraction data into electronic digital format (see subheading "Position Decoding Circuit Controller": The reference describes that the HI-STAR has an ultrafast 14-bit analog-to-digital converter (i.e. means for transfer of detected diffraction data into electronic digital format).)

As applied to claim 43, which is representative of claim 42, "Hi-Star Area Detector" discloses a multiwire gas proportional counter (see subheading "2-D Proportional Chamber": The reference describes that the HI-STAR comprises of a proportional chamber with a 2-D multiwire grid (i.e. a multiwire gas proportional counter).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Kurtz et al. and Maris by adding the use of a means for transfer of diffraction data into electronic digital format and a multiwire gas proportional counter as taught in “Hi-Star Area Detector” because the use of such a detector will “produce the best possible data on weakly diffracting samples, due to [its] unique ability to count single X-ray photons” (see “Hi-Star Area Detector”: subheading “Advanced Design”).

*Allowable Subject Matter*

14. Claims 1-23 would be allowable if the 37 CFR 1.126 claim objection set forth in this Office action is overcome.

The following is a statement of reasons for the indication of allowable subject matter: Independent claim 1 calls for a method of determining average grain size and grain size distribution of a polycrystalline material, comprising: providing a sample comprising said polycrystalline material; irradiating a measurement point on the sample with monochromatic radiation energy generated from a radiation source, wherein the beam size and divergence of said radiation energy is adjusted so that an adequate number of crystal grains of said sample is irradiated by the monochromatic radiation energy; detecting radiation energy diffracted from the sample to capture a plurality of diffraction arcs within a single data capture frame; generating average grain size and grain size distribution data from the diffraction data of the detected diffracted radiation energy, according to an integral grain size analysis protocol comprising the steps of: (a) digitally registering raw diffraction data from the plurality of diffraction arcs captured; (b) filtering the registered diffraction data to remove background noise, exclude diffraction overlaps or truncations, and compensate for biased data obtained from regions with

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highly preferred orientations; and (c) correlating average grain size and grain size distribution data with the filtered diffraction data. The integral grain size analysis protocol comprising the steps of: (a) digitally registering raw diffraction data from the plurality of diffraction arcs captured; (b) filtering the registered diffraction data to remove background noise, exclude diffraction overlaps or truncations, and compensate for biased data obtained from regions with highly preferred orientations; and (c) correlating average grain size and grain size distribution data with the filtered diffraction data “enables quantitative grain size analysis on materials exhibiting variation in material properties such as texture and residual stress, by both filtering out data highly affected by such variation, and mathematically factoring in the presence of such variation while correlating average grain size and grain size distribution with diffraction data. [This] new analysis protocol can be extended to any polycrystalline material in many different product forms” (see applicant’s specification: page 6, lines 18-22).

15. If the 37 CFR 1.126 claim objection set forth in this Office action is overcome, claims 29, 30, and 32-35 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. If the 37 CFR 1.126 claim objection set forth in this Office action is overcome, claims 31 and 36-38 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action, and to include all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Krill et al. (the article titled "Estimating grain size distributions in nanocrystalline materials from X-ray diffraction profile analysis") is pertinent in that the reference discloses a method of determining both grain size and grain size distribution.

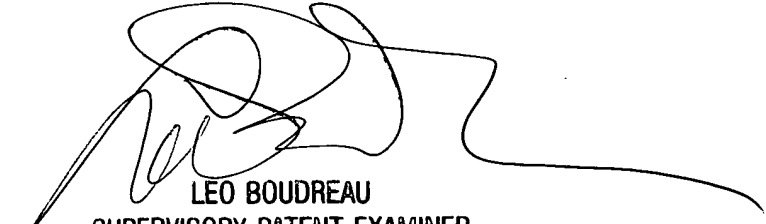
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J. Miller whose telephone number is (703) 306-4142. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Ryan J. Miller

Ryan J. Miller  
Examiner  
Art Unit 2621

  
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